

**CLAIMS**

1. A method for treating gases, comprising  
5 impurities, in which the gas at substantially atmospheric pressure is subjected to a radiofrequency inductively coupled plasma discharge.
2. The method as claimed in claim 1, the coupling  
10 to the discharge being of the transverse electric (TE) inductively coupled or H type.
3. The method as claimed in claim 1, the coupling  
to the discharge being of the transverse magnetic or E  
15 type.
4. The method as claimed in claim 1, the discharge  
being of the mixed E-H type.
- 20 5. The method as claimed in one of claims 1 to 4, the discharge being produced at a frequency between 50 kHz and 200 MHz.
6. The method as claimed in one of claims 1 to 5,  
25 the discharge taking place in a tube with an inside diameter of between 5 mm or 10 mm and 50 mm or 150 mm.
7. The method as claimed in one of claims 1 to 5,  
the discharge using a silica glass torch.  
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8. The method as claimed in claim 7, the torch  
having a double wall with circulation of a cooling  
liquid between the two walls.
- 35 9. The method as claimed in either of claims 7 and 8, the power of the torch being between 1 and 1000 kW.
10. The method as claimed in one of claims 1 to 5,  
the discharge using a refractory torch.

11. The method as claimed in claim 10, the torch being a ceramic or alumina torch.

5 12. The method as claimed in one of claims 1 to 5, the discharge using a metal torch.

13. The method as claimed in one of claims 1 to 12, the treated gas being a rare gas containing a  
10 perfluorinated (PFC) or hydrocarbon or hydrofluorocarbon (HFC) gas.

14. The method as claimed in claim 13, the discharge comprising at least one temperature zone  
15 above 5000 K.

15. The method as claimed in either of claims 13 and 14, in which oxygen and/or water is also added.

20 16. The method as claimed in one of the preceding claims, the throughput of treated gas being between 0.2 and 25 m<sup>3</sup>/h.

17. The method as claimed in one of the preceding  
25 claims, the treated gas comprising gaseous effluents issuing from a method for producing or growing or etching or cleaning or treating semiconductors or semiconducting or conducting or dielectric thin layers or substrates.

30 18. The method as claimed in one of claims 1 to 17, the treated gas comprising gaseous effluents issuing from a method for producing or growing or etching or cleaning or treating silicon thin layers.

35 19. The method as claimed in one of claims 1 to 17, the treated gas comprising gaseous effluents issuing from a method for producing display screens.

20. A system for treating gases by plasma, comprising means for producing a gas to be treated at a pressure substantially equal to atmospheric pressure and means for producing a radiofrequency plasma.

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21. The system as claimed in claim 20, the means for producing a radiofrequency plasma comprising a tube with an inside diameter of between 5 mm or 10 mm and 50 mm or 150 mm.

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22. The system as claimed in claim 21, the means for producing a radiofrequency plasma comprising a silica or refractory torch or a metal torch.

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23. The system as claimed in one of claims 20 to 22, further comprising means for cooling the means for producing a radiofrequency plasma.

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24. The system as claimed in one of claims 20 to 23, the means for producing a radiofrequency plasma comprising means for generating a current at a frequency of between 50 kHz and 200 MHz.

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25. The system as claimed in one of claims 20 to 23, the means for producing a gas to be treated at a pressure substantially equal to atmospheric pressure comprising pumping means of which the outlet is at a pressure substantially equal to atmospheric pressure.

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26. The system as claimed in one of claims 20 to 25, comprising a reactive element (70) for reacting the compounds resulting from the plasma treatment (68) for their destruction.

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27. A reactor device comprising a reaction chamber (62), producing at least one perfluorinated (PFC) or hydrofluorocarbon (HFC) gas, and further comprising a system for treating perfluorinated (PFC) gas or

hydrofluorocarbon (HFC) gas as claimed in one of claims 20 to 26.

28. The device as claimed in claim 27, the reaction  
5 chamber (62) forming part of a unit for producing or  
growing or etching or cleaning or treating flat screens  
or semiconducting devices or thin layers or  
semiconducting or conducting or dielectric thin layers  
or substrates, or being a reactor for shrinking  
10 photosensitive resins used for microcircuit  
lithography, or a reactor for depositing thin layers  
during plasma cleaning.

29. A unit for producing or growing or etching or  
15 cleaning or treating flat screens or semiconductors or  
semiconducting devices or semiconducting thin layers or  
substrates, comprising:

- a reactor (62), for producing or growing or  
20 etching or cleaning or treating flat screens or  
semiconductors or semiconducting devices or thin  
layers or semiconducting or conducting or  
dielectric thin layers or substrates, or a  
reactor for shrinking photosensitive resins used  
for microcircuit lithography, or a reactor for  
25 depositing thin layers during plasma cleaning,
- first means (64) for pumping the reactor  
atmosphere,
- a treatment system as claimed in one of claims  
20 to 25.

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30. The use of a radiofrequency inductively coupled  
plasma for gas purification and/or pollution control  
treatments.